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MAMMALS OF THE KELABIT PLATEAU NORTHERN SARAWAK

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Between September, 1945, and December, 1949, Mr. Tom Harrisson, now Curator of the Sarawak Museum, made a collection of mammals on the Kelabit Plateau in northeastern Sarawak. The collection was made while Mr. Harrisson was on military and other duties in the interior of Borneo. Knowledge of Bornean mammals has hitherto been based almost entirely on material from the coastal regions of the island. The present collection is the first comprehensive collection made in the interior and therefore is of considerable interest. It is also from the transitional region separating the Baram fauna, which tends to be quite distinctive, at the subspecific level, from the North Bornean fauna.

The interior uplands of northern Sarawak have been described by Harrisson (1949). They consist of a central forested area with an altitude of about 3,000 feet, separated from the coastal lowlands by a 6,000-foot mountain belt. Within the forested uplands are several islands of flat, open tablelands that are extensively cultivated by the native peoples. The largest of these tablelands, in the area under consideration here, is the Bario plain, a group of grassland islands in a rectangular area that measures about thirty miles from north to south and fifteen miles from east to west. The plain lies more than 3,000 feet above sea level. This upland area contains the headwaters of the Trusan, Limbang, and Baram Rivers, which flow northwest into the South China Sea. It is adjacent to the border of Indonesian Borneo, from which it is separated by what Harrisson calls the "spinal range" of mountains, 5,000-7,000 feet in altitude. The spinal range is a natural divide, since on the Indonesian side drainage is to the east into the Celebes Sea.

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The localities represented in the collection are (see map):

A. Localities on the Kelabit Plateau:

Bario, Kelabit village at about 3°45' N. and 115°27' E., elevation 3,700 feet.

Pa Bengar, Kelabit village southeast of Bario, elevation 3,300 feet.

Pa Dali, Kelabit village south-southeast of Bario, elevation 3,000 feet.

Pa Mada, Kelabit village, elevation 3,000 feet.

Pa Main, Kelabit village southeast of Bario, elevation 3,100 feet.

Pa Trap, Kelabit village northeast of Bario, elevation 3,500 feet.

Batu Patong, Kelabit village south-southeast of Bario, elevation 3,000 feet.

Pa Umur, Kelabit village east of Bario, elevation 3,000 feet.

B. Localities adjoining the plateau but walled off by high mountains:

Long Lelang, village near the headwaters of the Akah River, elevation 1,400 feet.

Long Akah, village on the Baram River, elevation 700 feet.

Pa Berang, Murut village, elevation 2,000 feet.

Long Lemako, village in Indonesian Borneo, elevation 2,500 feet.

The collection consists of 202 specimens, representing 51 species. These were made up in the field, most of them with the skulls inside. About one third are without skulls. There were no field measurements, and measurements appearing in the text were made by me on the dried skins. All measurements are in millimeters. Measurements of series of specimens are expressed as the mean, followed by the extremes in parentheses. In Chicago the skins were torn down, cleaned, and remade. The occipital region had been removed from the skull in all but one or two instances.

This material was collected under extremely difficult conditions, as a by-product of far more urgent military and civil operations, and by a man untrained in preparing mammal skins. Mr. Harrison is to be congratulated on the energy and enterprise he showed in undertaking such a project, not the least part of which was transporting the collection to the coast. Statements enclosed in quotation marks in the text of this report are quoted from data on field labels or in the collector's notes.

The collection will be divided between the Sarawak Museum and Chicago Natural History Museum.

The only previous report on the mammals of the Kelabit Plateau is by Lönnberg and Mjöberg (1925), based on a collection made by Mjöberg. Twelve species are listed. Two of these (*Trichys lipura*



Map of Northern Sarawak, showing localities mentioned in the text. Data from Harrison (1949).

and *Sus barbatus*) are not represented in the present collection, although the bearded pig was often shot by Mr. Harrison (see p. 146).

INSECTIVORA

Echinosorex gymnurus albus Giebel. Gymnure.

Gymnura alba Giebel, 1863, Zeitschr. Ges. Nat., **22**: 277—Banjermasin, South Borneo.

Echinosorex gymnurus albus Chasen, 1934, Bull. Raffles Mus., **9**: 87.

Specimens examined.—Indonesian Borneo, Long Lemako, Ulu Kerayan, 3,000 feet, two unsexed skins without skulls.

These specimens are marked, respectively: "This is not known on the [Kelabit] plateau," and "Does *not* cross onto plateau." Harrison's notes state that "this is remarkable, as the mountain barrier to Long Lemako is easy from Pa Bengar."

Both individuals exhibit scattered black-tipped hairs on the dorsal surface. These are slightly more numerous on the nape and rump. The ground color is dirty yellowish-white.

DERMOPTERA

Galeopterus variegatus borneanus Lyon. Flying Lemur.

Galeopterus borneanus Lyon, 1911, Proc. U. S. Nat. Mus., **40**: 24—Tjantung, Southeastern Borneo.

Galeopterus variegatus borneanus Chasen and Kloss, 1929, Bull. Raffles Mus., **2**: 18.

Specimens examined.—No locality, 2,800 feet, one unsexed skin without skull; Kubaan, Ulu Tutoh, 3,000 feet, one stuffed head only, without skull.

Both specimens represent the gray color phase. Neither is from the Kelabit Plateau, but from lower altitudes to the west separated from the plateau by high mountains.

Collector's notes.—"Caught in hole while clearing *ladang*."
"Food: leaves and insects (?ants)."

CHIROPTERA

Pteropus vampyrus natunae Andersen. Flying Fox.

Pteropus vampyrus natunae Andersen, 1908, Ann. Mag. Nat. Hist., (8), **2**: 369
—Panjang Island, North Natuna Islands.

Specimens examined.—Pa Trap, 4,500 feet, one female; Pa Trap, 4,000 feet, one female.

Palatal length of skull 41.6, 41.5; upper toothrow (C-M²) 28, 27.3.

Cynopterus brachyotis brachyotis Müller. Malaysian Fruit Bat.

Pachysoma brachyotis Müller, 1838, Tijdschr. Nat. Geschied. Physiol., 5, part 1, p. 146—Borneo.

Cynopterus brachyotis brachyotis Andersen, 1910, Ann. Mag. Nat. Hist., (8), 6: 624.

Specimens examined.—Pa Mada, 3,000 feet, one female.

Forearm length 55, palatal length of skull 15.4, upper toothrow (C-M²) 9.7.

Collector's note.—"In old secondary jungle."

Kerivoula sp.

Specimens examined.—One male, skin without skull, Bario, 3,700 feet.

Forearm 31.

Collector's note.—"In bent-over leaves."

PRIMATES

Tupaia glis longipes Thomas. Slender Treeshrew.

Tupaia ferruginea longipes Thomas, 1893, Ann. Mag. Nat. Hist., (6), 11: 343—Northwest Borneo.

Tupaia longipes longipes Lyon, 1913, Proc. U. S. Nat. Mus., 45: 76.

Tupaia glis longipes Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 39.

Specimens examined.—Bario, 3,700 feet, three adult males.

These three specimens show no individual variation in color. They are indistinguishable from specimens from the lowlands of northeastern North Borneo, except that the pelage is slightly more dense, especially on the belly.

Hind foot 50–53. Skull: palatal length 28.3 (27.3–29.5), zygomatic breadth 25–25.5, upper cheek teeth (not including canine) 16.9 (16.4–17.7). These measurements are practically identical with corresponding measurements of the North Bornean specimens mentioned above.

Collector's notes.—"In old jungle." "Snare in secondary jungle, on ground."

***Tupaia montana baluensis* Lyon.** Mountain Treeshrew.

Tupaia montana baluensis Lyon, 1913, Proc. U. S. Nat. Mus., 45: 95—Mt. Kinabalu, North Borneo, 3,000 feet.

Specimens examined.—Two males, one without skull, Bario, 3,700–3,800 feet.

Very similar to specimens from Mt. Kinabalu, except that the belly and under side of the tail are slightly more reddish. The black dorsal patch characterizing *T. m. montana* (type locality Mt. Dulit, slightly more than 100 miles southwest of Bario) is not even indicated. *T. m. baluensis* has hitherto been known only from Mt. Kinabalu and Mt. Murud. It appears to be a montane form.

Hind foot 40, 42. Upper toothrow 17.2.

Collector's notes.—"Low jungle, on flat." "Jungle."

***Tupaia tana kelabit*, new subspecies**

Type.—Subadult female (P3 not erupted), skin and skull minus occipital region. Collected at Bario, Kelabit Plateau, Fourth Division, Sarawak, 3,700 feet. No. 88366 Chicago Natural History Museum. Collected January 16, 1948, by Tom Harrisson. Original Number 104.

Diagnosis.—Similar to *T. t. utara* Lyon, but less brightly colored and lacking the black rump patch. Pelage dense and heavy. Pale area on either side of dorsal stripe narrow, olive-colored flecked with black. Sides of back and flanks dull reddish-brown, the shoulder stripe bordered above and below by the color of the sides. Hairs of sides of back and flanks banded, producing an agouti pattern. Belly rust-colored, sharply contrasted with the color of the flanks. Tail colored above like sides of body, under side buffy along midline.

Measurements.—Hind foot (from dried skin) 50. Palatal length of skull 31.5, upper cheek teeth 17.8.

Remarks.—Two additional specimens, an old unsexed individual from Pa Umur, 3,500 feet, and a juvenile female from Pa Main, 3,500 feet, agree with the type in all essential features. The old individual is slightly darker than the type; skull measurements of this individual are: palatal length 32.6, zygomatic breadth 26.5, upper cheek teeth 19.1.

Collector's notes.—"In old jungle." "In high virgin jungle."

***Tupaia minor minor* Günther.** Pigmy Treeshrew.

Tupaia minor Günther, 1876, Proc. Zool. Soc. London, 1876: 426—North Borneo, mainland opposite Labuan.

Tupaia minor minor Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 40.

Specimens examined.—Total 11. Bario, 3,700 feet, two males without skulls; Pa Mada, 3,000 feet, three females; Pa Dali, 3,000 feet, one female, one unsexed; Pa Main, 3,000 feet, 3,500 feet, one female, one unsexed; Pa Trap, one unsexed; one specimen no label.

This subspecies is said by Chasen and Kloss to differ from *T. m. caedis* of North Borneo in having the upper parts washed with brown and the shoulder stripe wider and whiter. The brown wash is very variable; a few specimens from northeastern North Borneo in the Chicago Natural History Museum collections are indistinguishable from Kuching specimens in this respect, although the brown is reduced or absent in most of the North Bornean specimens. The wider and whiter shoulder stripe, on the other hand, is very characteristic of *T. m. minor*.

The eleven specimens in the Kelabit series all show a distinct reddish-brown wash on the back, extending forward to the shoulder region. The shoulder stripe is broad and white, as in typical *minor*.

Hind foot 33 (32–34). Measurements of six adult skulls are: palatal length 17.9 (17.4–18.5), upper toothrow (C–M³) 12.1 (11.9–12.5). These measurements do not differ significantly from those of *T. m. caedis* of North Borneo.

Collector's notes.—"High jungle." "Low jungle (secondary)." "Jungle." "In low secondary jungle."

***Tupaia gracilis gracilis* Thomas**

Tupaia gracilis Thomas, 1893, Ann. Mag. Nat. Hist., (6), 12: 53—Base of Mt. Batu Song, Northern Sarawak.

Tupaia gracilis gracilis Lyon, 1913, Proc. U. S. Nat. Mus., 54: 117.

Specimens examined.—Bario, 3,700 feet, one male.

Coloration is similar to specimens from northeastern North Borneo and a specimen from Kuching. The shoulder stripe is indistinct. The tail in this species is markedly bushier than in *Tupaia minor*, which it otherwise resembles very closely.

Hind foot 40. Skull: palatal length 20, upper toothrow (C–M³) 14.2.

Collector's note.—"In low tree at edge of scrub near village."

***Nycticebus coucang borneanus* Lyon. Slow Loris.**

Nycticebus borneanus Lyon, 1906, Proc. U. S. Nat. Mus., 31: 535—Sakaia River, Sanggau District, Dutch West Borneo.

Nycticebus coucang borneanus Chasen, 1940, Bull. Raffles Mus., 15: 89.

Specimens examined.—Pa Mada, 3,500 feet, one male; Pa Main, 3,500 feet, one male.

Both specimens are light grayish-brown above; the individual from Pa Mada is inclined to be erythristic. The eye rings are prominent, dark brown in color, and continued above into the lighter brown of the top of the head. A dark brown median stripe (reddish-brown in the erythristic example) begins on top of the head and runs along the back. In one specimen it disappears at the sacrum, but in the erythristic specimen it continues, much narrowed and lighter in color on the lower back, to the root of the tail.

Skull: palatal length 21, zygomatic breadth 38.7, front of canine to rear of last molar 21.5.

Collector's notes.—"In old jungle." "Trapped in tree in old secondary jungle." "Not common on the plateau, and regarded as a wonderful animal by the Kelabits."

Macacus nemestrinus nemestrinus Linnaeus. Pig-tailed Macaque.

Simia Nemestrina Linnaeus, 1766, Syst. Nat., 12th ed., 1: 35—Sumatra.

Macacus nemestrinus Desmarest, 1820, Mammologie, Part 1, p. 66.

Specimens examined.—Bario, 3,700 feet, one male, skin without skull; Pa Umur, 3,400 feet, one subadult female.

The two specimens are similarly colored. Both are paler along the dorsal midline, particularly in the shoulder region, than a specimen from northeastern North Borneo or than two from Sumatra, the only material available for comparison. In the Kelabit specimens the crown of the head is dark, and a dark central area begins in the lumbar region and continues along the upper side of the tail to the tip. The ventral surface of both specimens is golden yellow.

Hind foot of male 140, of female 145. The skull of the female contains milk dentition.

Collector's notes.—"In jungle." "It is common, and does great harm to the Kelabit padi crops. Often comes to the ground and is caught in big drop traps."

Presbytis hosei hosei Thomas. Gray Leaf Monkey.

Semnopithecus hosei Thomas, 1892, Proc. Zool. Soc. London, 1892: 159—Niah, Baram, Sarawak.

Pithecus aygula hosei Chasen, 1940, Bull. Raffles Mus., 15: 78.

Specimens examined.—Total 4. Pa Umur, 3,400–3,500 feet, one male without skull, one female; Pa Main, one female, one juvenile female without skull.

The forehead in the male is white, bordered below by a narrow black brow band. A narrow extension of the black of the nape extends forward over the crown, but fails by 15 mm. to reach the black brow line. In the females the brow is white only at the midline, grading off into gray above the eyes.

The two female skulls, both adult, measure: total length 96, —; condylobasal length 75, —; basal length 66, 63.5; zygomatic breadth 75, 70; palatal length 33.5, 31; upper toothrow (C–M²) 31, 28.5.

Collector's notes.—"Virgin jungle, hilltop." "Virgin jungle." "The commonest monkey of the mountainsides. Never comes into secondary or village areas. Regarded as extra good eating by the Kelabits."

***Presbytis rubicunda ignita* Dollman. Maroon Leaf Monkey.**

Presbytis ignita Dollman, 1909, Ann. Mag. Nat. Hist., (8), 4: 204—Mt. Mulu, northern Sarawak.

Pithecus rubicundus ignitus Chasen, 1940, Bull. Raffles Mus., 15: 81.

Specimens examined.—Bario, 4,000 feet, one male; Mt. Batu Lawi, 6,500 feet, one unsexed; both without skulls; Kalalan, 3,500 feet, one male skull only.

These specimens have the hands and feet colored like the body, and are therefore referable to *ignita*. The general color is almost exactly like that of a series from the Sandakan Bay area.

Skull measurements: total length 88.9, condylobasal length 68, zygomatic breadth 66.5, palatal length 31.8, upper toothrow (C–M²) 28.4.

***Hylobates moloch funereus* Geoffroy. Gibbon.**

Hylobates funereus Is. Geoffroy, 1850, C. R. Acad. Sci. Paris, 31: 874—Island of Sulu (introduced).

Hylobates moloch funereus Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 2.

Specimens examined.—Total 5. Bario, 5,000 feet, one male skin and skull, one female skin only; Pa Berang, 2,000 feet, one male, one female; one specimen no locality.

There is a considerable range of color variation in this series, particularly in the extent and intensity of the dark areas. A characteristic feature of all except the male from Pa Berang (which comes from

off the plateau and is otherwise one of the darkest in the series) is that the fingers and toes—but not the metacarpal and metatarsal areas—are black. In this respect these specimens approach the coloration of *H. m. mülleri* of southeastern Borneo. The dorsal color is buffy-brown, very similar to specimens from Mt. Kinabalu and from near Sandakan. Occipital cap and whiskers black except in the male from Bario in which the whiskers are colored like the back. Under parts of body and inner sides of arms and legs brownish-black to black. In the female from Bario the outer sides of the arms and legs are nearly as dark as the inner.

Mean and extreme measurements of four adult skulls are: total length 104 (101.5–106.5; two skulls only), basal length 75.9 (72.8–80), zygomatic breadth 67.1 (63.5–72), palatal length 41.4 (40–42.5), upper tooththrow (C–M³) 31.9 (31–32.2).

RODENTIA

Ratufa affinis baramensis Bonhote. Giant Squirrel.

Ratufa ephippium baramensis Bonhote, 1900, Ann. Mag. Nat. Hist., (7), 5: 496
—Baram District, Sarawak.

Ratufa affinis baramensis Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 21.

Specimens examined.—Total 4. Bario, 5,500 feet, one female without skull; Batu Patong, 3,000 feet, one female; Pa Lungan, 3,500 feet, one unsexed; Long Laput (far down the Baram River in the lowlands), one female.

These specimens are referred rather arbitrarily to *baramensis*; they are almost exactly intermediate between *baramensis* and *sandakanensis*. As pointed out by Chasen and Kloss (1931) there is a north-south cline, beginning with Banguay Island in the north and extending southwest through North Borneo and Sarawak, in which the pelage gradually becomes suffused with rufous. The tail, coarsely grizzled in the north, tends to become uniform dark brown in the south. All four specimens (including the lowland individual from Long Laput) show a rufous wash, both above and below, as compared with specimens from the Sandakan Bay area. This is especially evident on the belly. Cheeks and sides of neck bright chestnut. Hands and feet tawny. Tail faintly grizzled, under side reddish at base.

Skull measurements of three adults are: total length 66, 70, —; condylobasal length 61.0 (56.4–65.3); palatal length 31.8 (30–33.5); interorbital constriction 27.7 (26.6–29); upper tooththrow 13.7 (13.3–

14.5). These measurements are consistently greater than the corresponding measurements of a series of five skulls of *sandakanensis* from northeastern North Borneo.

Rheithrosciurus macrotis Gray. Tufted Ground Squirrel.

Sciurus macrotis Gray, 1856, Proc. Zool. Soc. London, 1856: 341—Sarawak.

Rheithrosciurus macrotis Gray, 1867, Ann. Mag. Nat. Hist., (3), 20: 273.

Specimens examined.—Bario, 3,500 feet, one female skin without skull; Long Lelang, Ulu Akah, 1,400 feet, one male skin without skull.

These two specimens of this rare squirrel agree closely with a specimen from the Kalabakan River on the east coast of North Borneo, the only comparative material I have seen.

Measurements (made on the dry skin) of the Long Lelang specimen are: total length 660, tail 320, hind foot 85.

Callosciurus notatus dilutus Miller. Plantain Squirrel.

Sciurus dulitensis dilutus Miller, Smiths. Misc. Coll., 61, no. 21, p. 23—Tanjong Batu, Dutch East Borneo, lat. 2° 15' N.

Sciurus notatus dilutus Chasen, 1940, Bull. Raffles Mus., 15: 137.

Specimens examined.—Total 14. Bario, 3,700–3,900 feet, three males, one female; Pa Trap, 3,500 feet, one male, one female; Pa Main, 3,500 feet, one male; Batu Patong, 3,000 feet, three males, four females.

In color these squirrels are nearer to *dilutus* than to *dulitensis* (type locality Mt. Dulit, less than 100 miles southeast of the Kelabit Plateau). The belly, although variable, is a dilute ochraceous red. In three specimens there is some frosting on the belly hairs; this is also evident in specimens of *dilutus* from the Sandakan Bay area of North Borneo.

Hind foot 47–49. Skull measurements of 10 specimens are: palatal length 23.5 ± 0.31 (21.8–25.7), interorbital constriction 16.7 (15.2–18.8), upper toothrow 9.1 ± 0.04 (8.7–9.2). These do not differ significantly from corresponding measurements of a large series of *dilutus* from the Sandakan Bay area; they are slightly smaller than corresponding measurements of *dulitensis* from Kuching.

Collector's notes.—"Tall jungle behind long house." "In tall virgin jungle." "In low trees near sawah [padi field]." "In old secondary jungle."

Callosciurus albescens adamsi Kloss

Sciurus adamsi Kloss, 1921, Jour. Straits Branch Roy. Asiatic Soc., **83**: 151—
Upper Baram River, N.E. Sarawak.

Sciurus albescens adamsi Chasen, 1940, Bull. Raffles Mus., **15**: 140.

Specimens examined.—Pa Mada, 3,000 feet, one male; Batu Patong, 3,000 feet, one female.

These two specimens are essentially identical in coloration. The under parts are brick red, rather than reddish buff as in a specimen from near Sandakan, North Borneo. The dark line below the light lateral stripe is also much paler and the tail darker than in the Sandakan specimen. The characteristic buff patch behind the ear is evident in both specimens.

Hind foot 39.5, —. Skull: palatal length 19.9, 19.3; zygomatic breadth 23.5, —; interorbital constriction 14.9, —; upper cheek teeth 8.5, 8.1.

Tomeutes jentinki jentinki Thomas

Sciurus jentinki Thomas, 1887, Ann. Mag. Nat. Hist., (5), **20**: 128—Mt. Kinabalu, North Borneo.

Sciurus jentinki jentinki Chasen, 1937, Bull. Raffles Mus., **13**: 80.

Specimens examined.—Pa Main, 3,000 feet, one male, one female, one unsexed.

These specimens are slightly darker above and paler below than a topotype from Kinabalu. The Pa Main series agrees with Thomas' description except that the spot in front of the eye, the eye ring, and the edges of the ears are orange-buff instead of white or pale yellow as described by Thomas. The top of the head and entire back have a heavy rufous wash, brightest on head and lower back. The under side is white with an orange-buff wash.

Hind foot 34–36. Skull: condylobasal length 29, palatal length 17.1 (16.3–18), upper tooththrow 6.8–6.9.

Tomeutes lowi lowi Thomas. Low's Squirrel.

Sciurus lowii Thomas, 1892, Ann. Mag. Nat. Hist., (6), **9**: 253—Lumbidan, Sarawak.

Sciurus lowii lowii Chasen and Kloss, 1931, Bull. Raffles Mus., **6**: 28.

Specimens examined.—Long Lelang, Ulu Akah, 1,500 feet, one female.

Indistinguishable from specimens from North Borneo, except that it lacks the faint reddish wash on the under parts. It is sug-

gestive that this squirrel does not appear in the collection from higher altitudes, although Allen and Coolidge record it from 3,500 feet on Mt. Kinabalu. Harrison says it is known to the Kelabits but does not occur on the plateau.

Hind foot 35. Skull: palatal length 19.5, interorbital width 12.5, upper toothrow 7.8.

Nannosciurus whiteheadi Thomas. Tufted Pigmy Squirrel.

Sciurus whiteheadi Thomas, 1887, Ann. Mag. Nat. Hist., (5), 20: 127—Mt. Kinabalu, North Borneo, 3,000 feet.

Nannosciurus whiteheadi Chasen, 1940, Bull. Raffles Mus., 15: 149.

Specimens examined.—Barrio, 5,000 feet, one female; Ulu Kubaan, Ulu Tutoh, 3,800 feet, one male; Pa Main, 3,700 feet, one female; Libbun River, ?3,000 feet, one male.

A single topotype, from Mt. Kinabalu, is available for comparison. The Kelabit specimens are indistinguishable from the topotype. There is much variation in the peg-like anterior upper premolar in the Kelabit series; in one of three specimens this tooth is normal on both sides, in a second it is normal on the right and only about half normal size on the left, and in the third it is entirely wanting on both sides.

This is a montane form. According to Griswold (*in* Allen and Coolidge, 1940) it ranges from 3,000 to about 6,000 feet on Mt. Kinabalu.

Measurements of two individuals are: hind foot 25.8, 27; upper toothrow 3.9, 3.9.

Collector's notes.—"In high jungle." "Big tree. One only, going up." "Tall virgin jungle."

Dremomys everetti Thomas. Everett's Ground Squirrel.

Sciurus everetti Thomas, 1890, Ann. Mag. Nat. Hist., (6), 6: 171—Mt. Penrisen, Western Sarawak.

Dremomys everetti Chasen, 1940, Bull. Raffles Mus., 15: 147.

Specimens examined.—Barrio, 5,500 feet, one female; Barrio, one male, one unsexed.

The three specimens in this series, although fully adult, are slightly smaller and more rufous than two individuals from Mt. Kinabalu. No topotypes from Mt. Penrisen are available for examination.

This is a montane form. According to Griswold (*in* Allen and Coolidge, 1940) it occurs on Kinabalu from 3,500 to 11,000 feet.

The hind foot of one individual measures 40. Palatal length 22.6, 22.5; interorbital breadth 13.3, 12.1; upper cheek teeth 8.6, 8.7, 8.8.

Collector's notes.—"In tall old jungle, on ground." "On ground." "In sawah. Food: fruits, ants. Single."

Paralariscus hosei Thomas. Striped Ground Squirrel.

Sciurus hosei Thomas, 1892, Ann. Mag. Nat. Hist., (6), 10: 215—Mt. Batu Song, Baram District, Sarawak.

Paralariscus hosei Ellerman, 1949, The families and genera of living rodents, 3, pt. 1, p. 21.

Specimens examined.—Pa Main, 3,500 feet, one female skin and skull.

Iomys horsfieldi thomsoni Thomas. Horsfield's Flying Squirrel.

Sciuropterus thomsoni Thomas, 1900, Ann. Mag. Nat. Hist., (7), 5: 275—Baram District, Sarawak.

Iomys horsfieldi thomsoni Chasen, 1940, Bull. Raffles Mus., 15: 115.

Specimens examined.—Pā Trap, 4,000 feet, one female.

This specimen, which is somewhat battered, appears to agree with the type in size and color. I have seen no comparative material.

Measurements: hind foot 36.5, upper tooththrow 9.1.

Collector's note.—"In hole in tree. One young in body."

Hylopetes sagitta harrisoni Stone. Small Flying Squirrel.

Sciuropterus harrisoni Stone, 1900, Proc. Acad. Nat. Sci. Phila., 1900: 462—"Menbuang River," Sarawak.

Hylopetes sagitta harrisoni Chasen, 1940, Bull. Raffles Mus., 15: 116.

Specimens examined.—Batu Patong, 3,000 feet, one male skin without skull.

The upper surface of the body is brown, not "bright rusty red" as described for the type. Otherwise coloration appears to agree closely with that of the type.

Collector's note.—"In high jungle."

Rattus rattus turbidus Miller. Bornean House Rat.

Epimys rattus turbidus Miller, 1913, Smiths. Misc. Coll., 61, no. 21, p. 12—Tanggarong, south bank of Mahakam River, Southeast Borneo.

Rattus rattus turbidus Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 35.

Specimens examined.—Total 22, fifteen with skulls. Bario, 3,700 feet, 11; Pa Main, 3,000–3,500 feet, 9; Pa Umur, 3,300–3,400 feet, 2.

The coloration of the upper parts is very similar to that of a series of *turbidus* from Kuching, but the coloration of the under parts is quite different. There is considerable variation in ventral coloration in both series. The chest and belly of 12 of the 16 Kuching adults are dominantly gray with streaks, blotches, or an overlay of ochraceous. The under parts of the remaining specimens of this series are cream with yellow and ochraceous spots and blotches. In all specimens the basal parts of the underfur are pale gray. In the majority of the Kelabit series the chest and belly are gray, overlaid with buff to ochraceous, giving an olivaceous effect. In all Kelabit specimens the basal parts of the underfur are dark gray.

Hind foot in 13 Kelabit specimens (dry) 32.3 (30–37); for 13 Kuching specimens (collector's flesh measurements) 37 (32–42). Palatal length of 15 Kelabit skulls 21.2 ± 0.10 (19–24); 11 Kuching skulls 19.7 ± 0.61 (17.8–23.5). Upper cheek teeth in 15 Kelabit skulls 6.6 ± 0.05 (6.3–7.2); 12 Kuching skulls 7.14 ± 0.14 (6.5–8.5). For the cheek tooth measurements $p = .002$, a probability of 2 in 1000 that the difference between these two samples is due to chance.

Collector's notes.—Every specimen in this series of rats was associated with human culture. Eight labels are marked "*ladang*," four were taken "in *sawah*," five near house, and four in house or out-building.

***Rattus exulans ephippium* Jentink**

Mus ephippium Jentink, 1879, Notes Leyden Mus., 2: 15—Sumatra.

Rattus concolor ephippium Chasen, 1940, Bull. Raffles Mus., 15: 160.

Rattus exulans ephippium Ellerman, 1949, The families and genera of living rodents, 3, pt. 1, p. 47.

Specimens examined.—Total 19, nine with skulls. Bario, 3,700 feet, 16; Pa Umur, 3,300 feet, 2; Pa Main, 3,500 feet, 1.

The coloration of the upper parts is very similar to that of *ephippium* from Kuching or Sandakan, but the coloration of the under parts is quite different. In the lowland rats from Kuching and Sandakan the under parts are pale gray lightly overlaid with a wash of pale buff. In the Kelabit specimens the under parts are dark gray heavily overlaid with yellowish buff, giving an olivaceous effect. These differences closely parallel those in *R. r. turbidus*.

Hind foot 26.3 (25–27.5). Palatal length of skull 16.0 (13.3–18), upper cheek teeth 5.3 ± 0.06 (5.2–5.5).

Collector's notes.—All but one were associated with human culture. Nine labels are marked “in *sawah*,” two “in *ladang*,” seven “in *kooboo* [native hut],” and one “small cave in jungle.”

***Rattus mulleri borneanus* Miller**

Epimys borneanus Miller, 1913, Smiths. Misc. Coll., 61: 15—Karang Tigau Bay, Southeastern Borneo.

Rattus muelleri borneanus Chasen and Kloss, 1928, Jour. Malayan Br. Roy. Asiatic Soc., 6, (1), p. 47.

Specimens examined.—Bario, 3,700 feet, one male skin and skull; Pa Main, 3,700 feet, one male skin without skull.

The coloration of the upper parts is similar to that of lowland *borneanus* from Kuching, Lawas, and Sandakan. The under parts differ in having the underfur gray, contrasted with the very pale gray to buff underfur of the lowland specimens.

Zygomatic breadth of skull 24, palatal length 26.4, upper cheek teeth 8.9.

Collector's note.—The label of the Pa Main specimen is marked “in *ladang*.”

***Rattus cremoriventer kina* Bonhote. Pencil-tailed Rat.**

Mus kina Bonhote, 1903, Ann. Mag. Nat. Hist., (7), 11: 124—Mt. Kinabalu, North Borneo.

Rattus cremoriventer kina Chasen and Kloss, 1928, Jour. Malayan Br. Roy. Asiatic Soc., 6, (1), p. 46.

Specimens examined.—Bario, 3,700 feet, one male, one unsexed; both without skulls.

These two specimens are indistinguishable from specimens of *kina* from Kuching. Belly cream-colored.

Collector's notes.—“In small tree in jungle.” “Trapped in *sawah*.”

***Rattus rapit rapit* Bonhote**

Mus rapit Bonhote, 1903, Ann. Mag. Nat. Hist., (7), 11: 123—Mt. Kinabalu, North Borneo.

Rattus rapit rapit Chasen, 1940, Bull. Raffles Mus., 15: 176.

Specimens examined.—Bario, 3,700 feet, two males.

There are no appreciable differences in coloration between these and a specimen from Lumu Lumu, Mt. Kinabalu.

Palatal length of skull 16.2, —; upper cheek teeth 6.1, 6.5.

Collector's notes.—“In *kooboo* at night.” “Trapped in *sawah*.”

Rattus surifer bandahara Robinson

Rattus bandahara Robinson, 1921, Ann. Mag. Nat. Hist., (9), 7: 235—Mt. Kinabalu, North Borneo.

Rattus surifer bandahara Chasen and Kloss, 1928, Jour. Malayan Br. Roy. Asiatic Soc., 6, (1), p. 45.

Specimens examined.—Bario, 3,700 feet, one skin without skull; Pa Umur, 3,500 feet, one skin and skull; Pa Main, 3,800 feet, one skin and skull.

These specimens exhibit the characters given by Robinson as distinguishing *R. surifer bandahara* from *R. rajah*: underfur gray rather than brown, color of upper parts carried across inner side of hind legs above the ankle, and nasal bones not prolonged backward beyond frontomaxillary suture.

In view of the statement by Chasen and Kloss (1931) that they did not find *bandahara* and *rajah* occurring together in any collection from a given locality, it is interesting that *Rattus rajah rajah* is not represented in the Kelabit collection.¹

Hind foot 40–42. Palatal length 20.5, 22.4; upper cheek teeth 6.7, 7.0.

Collector's notes.—"Snare in old jungle." "Trap in sawah." "In ladang."

Rattus whiteheadi whiteheadi Thomas

Mus whiteheadi Thomas, 1894, Ann. Mag. Nat. Hist., (6), 14: 452—Mt. Kinabalu, North Borneo.

Rattus whiteheadi whiteheadi Gyldenstolpe, 1920, Kungl. Svenska Vet. Akad. Handl., 60, no. 6, p. 42.

Specimens examined.—Total 6, five without skulls. Bario, 3,700 feet, five; Pa Main, 3,700 feet, one.

The coloration of the upper parts does not differ from that of specimens of *whiteheadi* from other parts of Borneo. The underfur of the belly is a darker gray than in any other Bornean specimen available for comparison, including a specimen from Lumu Lumu on Kinabalu. This imparts a slightly duller cast to the belly coloration in the Kelabit series.

Palatal length of the single skull is 15.4, upper cheek teeth 5.5.

¹ Chasen and Kloss (1931) suggested that "the brighter specimens from south-eastern Borneo referred to *rajah* by Lyon are perhaps *bandahara*." I have examined two of Lyon's specimens from Pulo Bauwal, now in Chicago Natural History Museum, and find that they are indeed *bandahara*.

Collector's notes.—The labels of five of the six specimens are marked “*sawah*.”

***Rattus sabanus sabanus* Thomas**

Mus sabanus Thomas, 1887, Ann. Mag. Nat. Hist., (5), 20: 269—Mt. Kinabalu, North Borneo.

Rattus sabanus sabanus Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 29.

Specimens examined.—Total 5, three with skulls. Pa Main, 3,700 feet, two; Pa Umur, 3,700 feet, one; Pa Bengar, 3,300 feet, one; Pa Mada, 3,000 feet, one.

I have no material with which to compare these specimens.

The hind foot measures 46–51. Palatal length of skull (all fully adult) 27.5, 29, 30.8; zygomatic breadth 24.5, 25, 26; upper cheek teeth 9.5, 10.5, 10.4.

Collector's notes.—“Caught in jungle.” “Caught in monkey trap in jungle.” “Near *ladang*, scrub.” “Snare in old jungle.” “Caught in longhouse. A jungle rat, seldom in house.”

***Chiropodomys pusillus* Thomas. Pencil-tailed Mouse.**

Chiropodomys pusillus Thomas, 1893, Ann. Mag. Nat. Hist., (6), 11: 345—Mt. Kinabalu, 1,000 feet, North Borneo.

Specimens examined.—Bario, 3,700 feet, two males.

These specimens are rather tentatively assigned to *pusillus*, largely on the basis of size. I have seen no representatives of any of the four species of *Chiropodomys* that Thomas described from northwestern Borneo.

Color above uniform pale reddish-brown, bases of hairs slate-colored. No markings on face. Under parts white with a faint wash of buff or salmon.

Measurements (type in parentheses): head and body 70, 75 (76); tail 110, 85 (81); hind foot 15, 17 (15.8); upper cheek teeth 3.6, —.

Collector's notes.—“In nest in grass.” “In nest, grass. Well known to us.”

***Thecurus crassispinis crassispinis* Günther. Thick-spined Porcupine.**

Hystrix crassispinis Günther, 1876, Proc. Zool. Soc. London, 1876: 736—Borneo, opposite Labuan Island.

Thecurus crassispinis crassispinis Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 38.

Specimens examined.—Pa Trap, 4,500 feet, one male; Bario, 3,700 feet, one juvenile male.

The larger individual, which is subadult (last molar not erupted) is very similar to an adult from Labuk Bay, North Borneo, except that it lacks the reddish cast to the brown of the coloration. There is no white on the nape, the throat is white, the hands and feet are very dark brown. The juvenile is paler throughout, and white predominates in the exposed parts of the quills on the posterior third of the body.

Hind foot of subadult 73. Skull: nasal length 26, zygomatic breadth 53.5, upper cheek teeth (last tooth not erupted) 18.

CARNIVORA

Charronia flavigula saba Chasen and Kloss. Yellow-throated Marten.

Martes flavigula saba Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 13—Bettotan, North Borneo.

Specimens examined.—Bario, 3,700 feet, two males, two females; Bario, 5,000 feet, one female without skull.

Four of these five specimens are indistinguishable from martens from the lowlands of eastern North Borneo. The anterior third of the body is light brown with a golden wash, the posterior two thirds dark brown, the tail and hind feet almost black. The fifth individual (3,700 feet) is paler throughout, and is inclined to be erythristic. In this individual the normally dark brown streak on the neck is reddish-brown, and the throat is heavily washed with reddish-brown.

Hind foot 79–82. The adult male skulls measure: total length 89.5, 89.4; condylobasal length 86.5, 89.4; zygomatic breadth 55.5, 54; upper tooththrow (C–M¹) 28, 28.3. The upper tooththrow in the two female skulls measures 26.2 and 26.4.

Collector's notes.—"Food: honey, grubs, and a few round worms and bugs." "On edge of *sawah* while harvesting."

Mustela nudipes leucocephala Gray. Weasel.

Gymnopus leucocephalus Gray, 1865, Proc. Zool. Soc. London, 1865: 119—Borneo.

Mustela nudipes leucocephala Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 14.

Specimens examined.—Total 5. Bario, 3,700 feet, one male without skull, one unsexed skin and skull; Pa Umur, 3,400 feet, one male;

Pa Mada, 3,200 feet, one male; Kelabit Plateau, 3,700 feet, one unsexed skin and skull.

There is practically no variation in coloration among these five specimens, except in the intensity of the vertebral stripe and the percentage of the tail tip that is light-colored. All are bright golden brown above and below, head to behind ears cream color, feet pale brown. The vertebral stripe extends from the occiput to about the middle of the back. It is very distinct in one specimen, pale golden brown in color. It is darker and more obscure in three individuals, and in the fifth is entirely wanting. The terminal half of the tail is light in two, the terminal third in one, and in the remaining two the tail becomes progressively lighter from base to tip without any demarcation between light and dark regions.

Hind foot 53-55. Variation in skull measurements is notable, as shown in the following table, although all appear to be adult.

Field No.	Sex	Palatal length	Zygomatic breadth	Upper tooththrow C-M ¹
26	—	23.4	—	15.5
28	♂	26.7	31	18
29	♂	26.3	—	17.3
30	—	25.8	29.6	16.5

Lutra sumatrana Gray. Hairy-nosed Otter.

Barangia sumatrana Gray, 1865, Proc. Zool. Soc. London, 1865: 123—Sumatra.

Lutra sumatrana Anderson, 1878, Zool. Res. Yunnan, 1: 206.

Specimens examined.—Pa Umur, 3,900 feet, one male.

This specimen is reddish-brown above, paler below, the belly having a buffy wash. Lips and foreparts of throat cream color.

Zygomatic breadth 53, palatal length 43, length of palate behind M¹ 7.5, upper tooththrow (C-M¹) 30. The teeth in this specimen are small; the greatest length of P⁴ is only 9.9 mm.

Collector's note.—"In small rocky brook. The animal also goes into jungle. Food: crabs and small fish."

Amblonyx cinerea cinerea Illiger. Clawless Otter.

Lutra cinerea Illiger, 1815, Abh. Akad. Wiss. Berlin, 1804-1811: 90—near Batavia, west Java.

Amblonyx cinerea Pocock, 1941, Fauna Brit. India, Mammalia, 2: 306.

Specimens examined.—Total 6. Pa Main, 3,500 feet, one female, two juveniles; Bario, 3,800 feet, one male skin without skull; Bario, one male, one female.

Two of the adults are dark brown above and only slightly paler below. A third is slightly paler with a reddish cast above and distinctly grizzled below. The fourth (the parent of the young) is a beautiful reddish-buff above and slightly paler below. In all except the buff individual the lips are white, and the throat varies from very light to very dark gray. The two young are very pale brown, darker than the parent and lacking the warm reddish cast. The buff-colored individual had lost its tail during life, only a short stump remaining.

Mean and extreme measurements of three adult skulls are: zygomatic breadth 57.5 (55–60), palatal length 42 (40–45), upper tooth-row (C–M¹) 29.3 (28.2–30.7).

Collector's notes.—"In small shingle and sand stream on flats two miles from village." "In stream in jungle. Many others. Food: fish." "In stream in jungle. Many others."

***Mydaus javanensis lucifer* Thomas. Teledu.**

Mydaus lucifer Thomas, 1902, Ann. Mag. Nat. Hist., (7), 9: 442—Borneo, opposite Labuan Island.

Mydaus javanensis montanus Moulton, 1921, Jour. Straits Branch Roy. Asiatic Soc., 83: 143—Mt. Murud, Sarawak.

Mydaus luciferoides Lönnerberg and Mjöberg, 1925, Ann. Mag. Nat. Hist., (9), 16: 509—Kelabit Plateau, near Mein.

Specimens examined.—Pa Main, 3,300 feet, one male (skin only); Pa Umur, 3,500 feet, one unsexed (skin only), one juvenile male.

All three specimens are black with a broad white patch on the crown and nape tapering to a narrow mid-dorsal stripe continuous to the tip of the tail. In one individual the dorsal stripe is almost, but not quite, interrupted at the shoulder region. One specimen has a nuchal whorl, while in the other two it is absent.

The names proposed for the Kelabit form by Moulton (based on supposedly larger size), and by Lönnerberg and Mjöberg (based on the presence of a whorl on the nape) have been discussed by Thomas (1927, Ann. Mag. Nat. Hist., (9), 20: 288) and Kloss (1927, Jour. Malayan Br. Roy. Asiatic Soc., 5: 348).

The following measurements were made on the two adults, made up into study skins: head and body 490, 520; tail 35, —; hind foot 70, 64.

***Prionodon linsang gracilis* Horsfield. Linsang.**

Felis gracilis Horsfield, 1821, Zool. Researches Java, no. 1, pl.—Blambangan, E. Java.

Prionodon linsang gracilis Robinson and Kloss, 1919, Jour. Fed. Malay States Mus., 7: 264.

Specimens examined.—Bario, 3,800 feet, one female; Pa Dali, 3,000–3,500 feet, one unsexed skin without skull.

These two specimens are indistinguishable from a specimen taken near Kuching and another labeled "N. Borneo" (probably Sarawak). There are five transverse bands across the back, the last narrow and broken and tending to fuse with the first caudal ring. The ground color is buff, and the markings are chocolate brown.

Skull measurements of the female, which is fully adult, are: zygomatic breadth 32, palatal length 31, upper tooththrow (C–M¹) 23.8.

Collector's notes.—"Trapped in jungle snare line—not far in. Food: 1 + large sp. long-tailed rat (rotten)." "Trapped in jungle."

***Paradoxurus hermaphroditus philippinensis* Jourdan. Palm Civet.**

Paradoxurus philippinensis Jourdan, 1837, C. R. Acad. Sci. Paris, 5: 523—Philippine Islands.

Paradoxurus hermaphroditus philippinensis Pocock, 1934, Proc. Zool. Soc. London, 1934: 654.

Specimens examined.—Pa Main, 3,700 feet, one male.

This specimen is colored almost exactly like a specimen from Kuching, except that the tail is slightly darker. The face mask is not quite as conspicuous as in the Kuching specimen but is much brighter than in a series from northeastern North Borneo. Three faint longitudinal dark stripes running from the occiput to the base of the tail are visible if the skin is examined from the rear in good light.

Hind foot 69. Skull: palatal length 44, zygomatic breadth 53, upper tooththrow (C–M²) 36.

***Arctogalidia trivirgata stigmatica* Temminck. Small-toothed Palm Civet.**

Paradoxurus stigmaticus Temminck, 1853, Esquisses Zool. Côte de Guinée, Mamm., p. 121—Dusun River, S. Borneo.

Arctogalidia trivirgata stigmatica Pocock, 1933, Proc. Zool. Soc. London, 1933: 996.

Specimens examined.—Total 4. Pa Umur, 3,400–3,500 feet, one male, two females; Bario, one male.

All four specimens are much paler than a specimen from Kuching or than specimens from northeastern North Borneo. Two are yellowish-gray with reddish-brown face, ears, feet, and tail. The third

is similar but lightly washed with reddish-brown. The fourth (from Bario) is more heavily washed with reddish-brown. The light median nose stripe is evident in all, as are the typical three dark longitudinal stripes extending from occiput to base of tail.

Skull measurements of an adult female from Pa Umur are: condylobasal length 99, zygomatic breadth 60, palatal length 55, upper toothrow (C-M²) 37.5.

Collector's note.—The male from Bario is marked "In jungle. Food: fruit."

***Paguma larvata ogilbyi* Fraser. Masked Palm Civet.**

Paradoxurus ogilbyi Fraser, 1846, Zool. Typica, no. 10—type locality unknown.

Paguma larvata ogilbyi Pocock, 1934, Proc. Zool. Soc. London, 1934: 679.

Specimens examined.—Total 4. Pa Umur, 3,400 feet, one female, one juvenile male; Pa Umur, 3,500 feet, one unsexed skin without skull; Pa Main, one female.

These specimens are quite uniform in coloration, except that the juvenile is generally paler than the adults. General color reddish-brown, becoming very dark brown, almost black, on shoulders and nape. Face yellowish-white, washed with brown on muzzle and around eyes. There is considerable individual variation in the extent of brown on the face; in one specimen little more than the cheeks are pure yellowish-white. Throat dirty yellowish-brown. Belly paler than back. Lower legs and hands and feet very dark brown. Tail colored like body at base, terminal half dark brown or black, tip yellowish-white in three of the four specimens.

Skull measurements of an adult female from Pa Umur are: condylobasal length 119, zygomatic breadth 60, palatal length 59, upper toothrow (C-M²) 43.

***Hemigalus derbyanus boiei* Müller. Banded Palm Civet.**

Viverra boiei Müller, 1838, Tijdschr. nat. Geschied. Physiol., 5: 144—South-east Borneo.

Hemigalus derbianus boiei Chasen and Kloss, 1931, Bull. Raffles Mus., 6: 11.

Specimens examined.—Total 7. Pa Umur, 3,400–3,600 feet, two females without skulls, three unsexed without skulls, one unsexed skin and skull, one male skin with skull.

Except for the usual variation in pattern and ground color, this series agrees closely with a specimen from Sandakan, North Borneo, and an old specimen labeled "Borneo," received from Gerrard's of London and probably collected by A. H. Everett.

Skull measurements of the adult male (skull minus occiput) are: palatal length 50, zygomatic breadth 46.4, upper toothrow (C-M²) 37.3, upper premolar-molar series 31.1. This is the shortest toothrow for this subspecies that is known to me. Measurements of the unsexed skull are: palatal length 54, zygomatic breadth 50, upper premolar-molar series 34.5.

Diplogale hosei Thomas. Hose's Palm Civet.

Hemigalus hosei Thomas, 1892, Ann. Mag. Nat. Hist., (6), 9: 250—Mt. Dulit, Sarawak, 4,000 feet; Chasen, 1940, Bull. Raffles Mus., 15: 102.

Diplogale hosei Thomas, 1912, Abstr. Proc. Zool. Soc. London, March 19, 1912, p. 18; Pocock, 1933, Proc. Zool. Soc. London, 1933: 1010.

Specimens examined.—Total 4. Pa Umur, 3,500 feet, one male, one female; Pa Dali, 3,500 feet, one female without skull; Bario, one male.

This is the largest series of this rare civet ever assembled from one locality. It reinforces the supposition that *Diplogale* is a montane form; previous records are Mt. Dulit, 4,000 feet (Thomas, 1892), Mt. Batu Song, 2,000 feet (Hose, 1893, Mammals of Borneo, p. 23), Mt. Kinabalu, no altitude given (Pocock, 1933).

Chasen (1940, Handlist Malaysian Mammals, p. 102) returned this species to the genus *Hemigalus* without comment, and Ellerman and Morrison-Scott (1955, Supplement to Chasen [1940], p. 24) deemed *Diplogale* "valid as a subgenus." The genus *Diplogale* was recognized by Pocock (1933), who reviewed the generic characters in some detail. The Kelabit series confirms Pocock's review. The Bario specimen, an old male, has a distinct sagittal crest running the entire length of the braincase, a condition never seen in *Hemigalus derbyanus* or in *Chrotogale owstoni* from Indo-China, and only approached by the younger specimens of *D. hosei* hitherto available. The dentition of *Diplogale* (fig. 21) is considerably more primitive than that of *Hemigalus* or *Chrotogale*. The first upper premolar is two-rooted in all three skulls. In my judgment the morphological differences between *derbyanus* and *hosei*, together with the characteristic high-altitude distribution of *hosei*, indicate more than specific distinction.

The Kelabit specimens exhibit little color variation, and agree with the description given by Pocock. They are dark brown above, becoming lighter on the sides, with a buffy-gray patch beginning above the eye and continuing behind the eye onto the cheek, ending abruptly where it meets the white of the lips and throat. Lips and

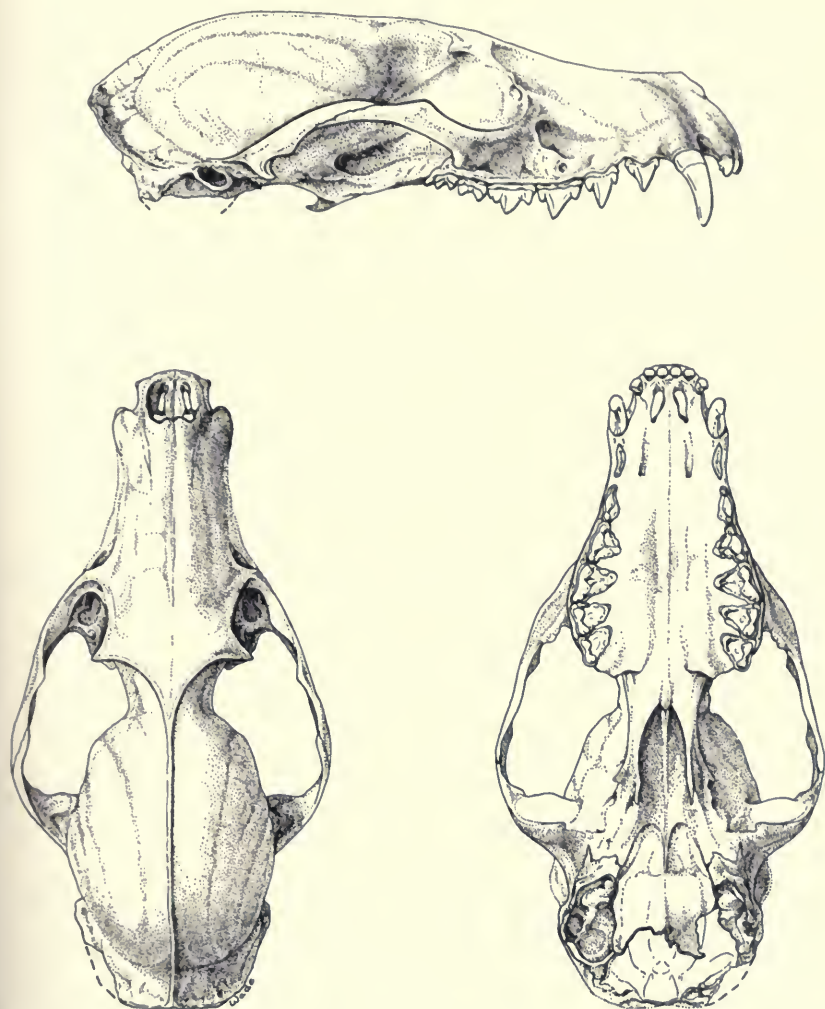


FIG. 21. Skull of *Diplogale hosei*. Skull from CNHM no. 74275 (adult male, Bario), dentition from CNHM no. 88298 (adult male, Pa Umur). The basioccipital region is somewhat damaged.

throat white, becoming yellowish-white to buffy on the neck and under side of body. The specimen from Pa Dali is paler than the two from Pa Umur, and the individual from Bario is slightly rufescent.

The hind foot of the Pa Umur female measures 69. Measurements of the three skulls, all adult and lacking the occipital region,

are: zygomatic breadth 48.7, 45, 39; palatal length 50, 49, 47; upper tooththrow (C-M²) 37.7, 37.5, 36.5.

Collector's notes.—"Snared in jungle." "In jungle (tree top)." "In jungle; food: insects, ants."

***Herpestes brachyurus rajah* Thomas.** Short-tailed Mongoose.

Herpestes brachyurus rajah Thomas, 1921, Ann. Mag. Nat. Hist., (9), 8: 135—Sarawak.

Herpestes brachyurus dyacorum Thomas, 1921, Ann. Mag. Nat. Hist., (9), 8: 135—Mt. Dulit, Sarawak.

Specimens examined.—Ulu Kubaan, Ulu Tutoh, 3,900 feet, one female.

This specimen agrees well with the description, except that the tail is not notably paler than the back. It definitely is not "buffy," as Chasen and Kloss (1931) described the tails of specimens from North Borneo.

Hind foot 77, tail 180±. Skull: zygomatic breadth 49, palatal length 46.6, upper tooththrow (C-M²) 33, upper cheek teeth only 27.2.

***Herpestes semitorquatus semitorquatus* Gray.** Collared Mongoose.

Herpestes semitorquatus Gray, 1846, Ann. Mag. Nat. Hist., 18: 211—North Borneo, mainland opposite Labuan.

Herpestes semitorquatus semitorquatus Chasen, 1940, Bull. Raffles Mus., 15: 103.

Specimens examined.—Bario, 3,700 feet, one male, skin without skull.

This specimen agrees fairly well with the original description, except that the dorsal surface is not speckled except on the crown of the head; it thus resembles *H. s. uniformis* Robinson and Kloss (1919, Jour. Fed. Malay States Mus., 7: 302—Western Sumatra). These authors state that in a specimen from Mt. Dulit (4,000 feet) "the whole of the dorsal area has marked yellow tips to the hairs, giving a strongly grizzled effect."

General color chestnut. A broad, poorly defined mid-dorsal band colored dark brown coarsely mixed with reddish-brown and buff, contrasting with the uniformly bright chestnut sides and under parts. Individual hairs on back reddish-brown at base, followed by a broad band of dark brown, then a slightly narrower band of reddish-brown, and the extreme tip dark brown. Crown and muzzle brown finely speckled with buff. Lower sides of neck reddish-buff, sharply sep-

arated from the color of the upper sides of neck. Hands and feet very dark brown, almost black. Tail with a buffy wash produced by buff-colored tips of hairs; there is some dark brown on the upper side of the proximal half.

Tail $280 \pm$, hind foot 83.

Collector's notes.—"In jungle. Food: grass, ants. Single."

***Felis bengalensis borneoensis* Brongersma. Leopard Cat.**

Prionailurus bengalensis borneoensis Brongersma, 1935, Zool. Meded. (Leiden), 18: 26—Rantau, S.E. Borneo.

Felis bengalensis borneoensis Chasen, 1940, Bull. Raffles Mus., 15: 108.

Specimens examined.—Bario, 3,800 feet, one adult male; Bario, one adult unsexed; Pa Umur, 3,500 feet, one kitten.

Both adults are much less richly colored than specimens from lowland areas in North Borneo, which they otherwise resemble.

The two adult skulls measure: palatal length 31.7, 34.4; zygomatic breadth 54.5, 57; upper toothrow (C-M¹) 25, 27.3; length of mandible 52.4, 54.5.

Collector's notes.—"Snare line in old secondary jungle near village."

***Tragulus javanicus borneanus* Miller. Mouse Deer.**

Tragulus borneanus Miller, 1902, Proc. Biol. Soc. Wash., 15: 174—North Borneo, Suanlamba River.

Tragulus javanicus borneanus Kloss, 1918, Jour. Fed. Malay States Mus., 7: 248.

Specimens examined.—Pa Main, 3,700 feet, one adult female.

This specimen is similar to specimens taken within ten miles of the type locality of *borneanus*, except that the belly is immaculate. There is a broad, ill-defined nuchal stripe, which may be present or absent in North Bornean specimens.

Hind foot 150, palatal length 70, zygomatic breadth 47.5, upper cheek teeth 37.5.

FAUNAL AFFINITIES

The Kelabit mammalian fauna is mixed in character, from the standpoints of both horizontal and vertical distribution. The North Bornean mammalian fauna is only slightly differentiated from that of Sarawak, the great majority of the forms being indistinguishable on the basis of available data. Excluding the Chiroptera, of the 51 species represented in the Kelabit collection only six can be regarded

as exhibiting either northern or southern affinities. A seventh, *Ratufa affinis*, is almost exactly intermediate between *sandakanensis* of North Borneo and *baramensis* of Sarawak. The six forms that can be assigned as either northern or southern are:

Northern affinities: *Tupaia tana paitana*, *T. minor baluensis*, *Presbytis hosei hosei*, *Hylobates moloch funereus*, *Callosciurus notatus dilutus*.

Southern affinities: *Tupaia minor minor*.

The Kelabit fauna would appear to be more closely allied with that of North Borneo than with that of Sarawak.

Although the altitude of the plateau is not great, undoubted montane elements are present in the fauna and certain forms common at lower altitudes appear to be wanting. Six montane forms are represented: *Tupaia montana baluensis*, *Callosciurus jentinki jentinki*, *Nannosciurus whiteheadi*, *Dremomys everetti*, *Rattus rapit rapit*, *Diplogale hosei*.

Ten species are not represented in the collection from altitudes above 3,000 feet and may be presumed to be lowland forms. Further collecting may produce some of these at higher altitudes, but most are so abundant where they do occur that it is unlikely they would have been overlooked in the Kelabit collecting. The absence of *Echinosorex* on the plateau appears to be a local hiatus. Very large mammals, such as deer, were not collected because of difficulties of handling and transportation. Lowland elements apparently absent on the Kelabit Plateau are: *Ptilocercus lowi*, *Tarsius bancanus*, *Macacus irus*, *Presbytis cristatus* (*pyrrhus* of authors), *Nasalis larvatus*, *Pongo pygmaeus*, *Tomeutes hippurus*, *T. lowi*, *Nannosciurus exilis*, *Viverra zibetha*.

ADDITIONAL RECORDS

Harrison notes six additional species as occurring on the plateau but not preserved because of their large size. These are:

Cervus unicolor, sambar deer.—Common. Often shot by T. H.

Muntiacus sp., barking deer.—Abundant. Often shot by T. H.

Sus barbatus, bearded pig.—Seasonally abundant. "The staple source of Kelabit meat."

Bos sondaicus, temadau.—"Occasionally wanders over from the grasslands fifty miles away in the headwaters of the Bahau (which flows into the Batang Kayan River), where I have seen many. A

single one roamed the jungle between Pa Main and Mt. Murud for months. Many hunters went after it, without success."

Helarctos malayanus, Malay bear.—Common. Thrice seen by Harrison and often taken by Kelabits for the skin.

Arctictis binturong, binturong.—"Quite common, especially around Pa Main. Seen by Harrison."

"The Sumatran rhinoceros (*Rhinoceros sumatrensis*), once common in the area—in the last century even breaking fences around padi fields—has not been reported anywhere in the area for twenty years. There are living Kelabits who have killed more than ten."

REFERENCES

ALLEN, G. M., and COOLIDGE, H. J.

1940. Mammal and bird collections of the Asiatic Primate Expedition. Mammals. Bull. Mus. Comp. Zool., 87: 131-166.

CHASEN, F. N., and KLOSS, C. B.

1931. On a collection of mammals from the lowlands of North Borneo. Bull. Raffles Mus., 6: 1-82.

HARRISSON, TOM

1949. Explorations in central Borneo. Geogr. Jour., 114: 129-150.

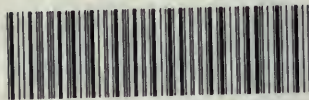
LÖNNBERG, E., and MjöBERG, E.

1925. Mammalia from Mount Murud and the Kalabit country. Ann. Mag. Nat. Hist., (9), 16: 508-513, pl. 27.

1950. Squirrels from the Kelabit uplands. Sarawak Mus. Jour., 5: 297-299.



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